Agilent N9344C Handheld Spectrum Analyzer (HSA)

20 GHz

Data Sheet

Field testing just got easier

www.agilent.com/find/hsa

If you are making measurements in the field, the Agilent N9344C handheld spectrum analyzer (HSA) makes your job easier. It's got the features you need for operating in tough field environments, and its measurement performance gives you confidence the job's been done right. The N9344C HSA lets you automate routine tasks to save time and ensure consistent results. Field testing just got easier with the Agilent N9344C HSA.

Anticipate ___Accelerate ___Achieve

Agilent Technologies

Your job just got easier:

- Get the features you need in a **field-ready** instrument.
- Gain confidence in your measurements with **benchtop** performance in a handheld instrument.
- Innovative **task planner** (www.agilent.com/find/taskplanner) reduces test setup time by 95%, delivers test automation and consistency, and makes it easy to capture test results, generate reports, and share task plans with others.

Definitions and requirements

This data sheet contains specifications and supplemental information for Agilent N9344C handheld spectrum analyzer. The differences between specifications, typical performance, and nominal values are described as follows.

Definitions

"Specifications" describe the performance of parameters covered by the product warranty and apply to temperatures ranging from –10 to 50 °C, unless otherwise noted.

95th percentile values indicate the breadth of the population (> 2) of performance tolerances expected to be met in 95% of the cases with a 95% confidence, for any ambient temperature in the range of 20 to 30 °C. In addition to the statistical observations of a sample of instruments, these values include the effects of the uncertainties of external calibration references. These values are not warranted. These values are updated occasionally if a significant change in the statistically observed behavior of production instruments occurs.

"Typical" describes additional product performance information that is not covered by the product warranty. It is performance beyond specification that 80% of the units exhibit with a 95% confidence level over the temperature range of 20 to 30 °C. Typical performance does not include measurement uncertainty.

"Nominal values" indicate expected performance, or describe product performance that is useful in the application of the product, but is not covered by the product warranty.

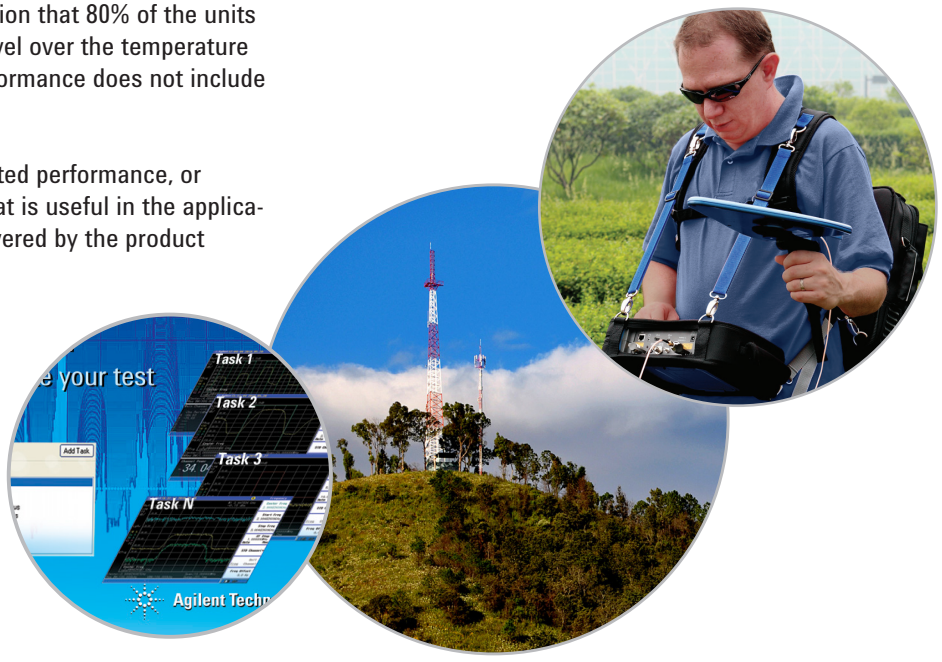
Conditions required to meet specifications

The following conditions must be met for the analyzer to meet its specifications.

- The analyzer is within its calibration cycle.
- Under auto couple control, except when Swp Time Rule is set to Accuracy.
- Any analyzer that has been stored at a temperature range inside the allowed storage range but outside the allowed operating range must be stored at an ambient temperature within the allowed operating range for at least two hours before being turned on.
- The analyzer has been turned on at least 30 minutes.

Certification

Agilent Technologies certifies that this product met its published specifications at the time of shipment from the factory. Agilent Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology (NIST), to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization (ISO) members.



Specifications

Specification			Supplemental information
Frequency			
Frequency range		1 MHz to 20 GHz (usable to 9 kHz)	AC coupled
Internal 10 MHz frequency reference accuracy			
Aging rate		± 1 ppm/year	
Temperature stability		± 1 ppm	Referenced to frequency reading at 25 °C. Temperature varied at max. of 2 °C per minute. Control voltage held at voltage control range midpoint
Frequency readout accuracy with marker (start, stop, center, marker)			
Marker resolution		(frequency span)/(sweep points - 1)	
Uncertainty		± (frequency indication × frequency reference uncertainty + 1% × span + 20% × resolution bandwidth + marker resolution + 1 Hz)	Frequency reference uncertainty = (aging rate × period of time since adjustment + temperature stability)
Marker frequency counter			
Resolution		1 Hz	
Accuracy		± (marker frequency × frequency reference uncertainty + counter resolution)	RBW/span ≥ 0.02; marker level to displayed noise level > 25 dB; frequency offset 0 Hz
Frequency span			
Range		0 Hz (zero span), 100 Hz to 20 GHz	
Resolution		1 Hz	
Accuracy		± (0.22% × span + span/(sweep points - 1))	Nominal
SSB phase noise			
Carrier offset	30 kHz	< –86 dBc/Hz, typical –89 dBc/Hz	20 to 30 °C
	100 kHz	< –97 dBc/Hz, typical –99 dBc/Hz	Center frequency 500 MHz
	1 MHz	< –115 dBc/Hz, typical –119 dBc/Hz	
Resolution bandwidth (RBW)			
–3 dB bandwidth		10 Hz to 3 MHz	1-3-10 sequence
Accuracy		± 5%, RBW = 10 Hz to 1 MHz	Nominal
		± 10%, RBW = 3 MHz	
Resolution filter shape factor		< 5:1	Nominal; 60 dB/3 dB bandwidth ratio; digital, Gaussian-like
Video bandwidth (VBW)			
–3 dB bandwidth		1 Hz to 3 MHz	1-3-10 sequence
Accuracy		± 10%, VBW = 1 Hz to 1 MHz	Nominal

Specifications (continued)

Amplitude specifications				Supplemental information
Measurement range				
1 to 500 MHz		Displayed average noise level (DANL) to +10 dBm		Preamp off
500 MHz to 20 GHz		Displayed average noise level (DANL) to +20 dBm		
Input attenuator range		0 to 50 dB, in 5 dB steps		
Maximum safe input level				
Average continuous power		+30 dBm, 3 minutes maximum		Input attenuator setting ≥ 20 dB, 1 MHz to 20 GHz
DC voltage		± 50 VDC maximum		
Displayed average noise level [1]				
Preamp off		**Normalized to 1 Hz**	**Minimum RBW**	
1 to 10 MHz		–125 dBm, typical –140 dBm	–115 dBm, typical –130 dBm	Reference level ≤ –50 dBm
10 MHz to 3 GHz		–137 dBm, typical –142 dBm	–127 dBm, typical –132 dBm	
3 to 7 GHz		–135 dBm, typical –140 dBm	–125 dBm, typical –130 dBm	
7 to 10 GHz		–139 dBm, typical –142 dBm	–129 dBm, typical –132 dBm	
10 to 13 GHz		–137 dBm, typical –140 dBm	–127 dBm, typical –130 dBm	
13 to 16 GHz		–136 dBm, typical –139 dBm	–126 dBm, typical –129 dBm	
16 to 18 GHz		–134 dBm, typical –139 dBm	–124 dBm, typical –129 dBm	
18 to 20 GHz		–126 dBm, typical –131 dBm	–116 dBm, typical –121 dBm	
Preamp on				
1 to 10 MHz		–140 dBm, typical –156 dBm	–130 dBm, typical –146 dBm	Reference level ≤ –70 dBm
10 MHz to 3 GHz		–150 dBm, typical –154 dBm	–140 dBm, typical –144 dBm	
3 to 6 GHz		–145 dBm, typical –150 dBm	–135 dBm, typical –140 dBm	
6 to 13 GHz		–151 dBm, typical –155 dBm	–141 dBm, typical –145 dBm	
13 to 16 GHz		–149 dBm, typical –153 dBm	–139 dBm, typical –143 dBm	
16 to 18 GHz		–147 dBm, typical –151 dBm	–137 dBm, typical –141 dBm	
18 to 20 GHz		–137 dBm, typical –142 dBm	–127 dBm, typical –132 dBm	
Level display range				
Log scale		10 to 100 dB, 10 divisions displayed, 1, 2, 5, 10 dB/division		
Linear scale		0 to 100%, 10 divisions displayed		
Scale units		dBm, dBmV, dBµV, W, V, dBmV EMF, dBµV EMF, V EMF		
Sweep (trace) points		461		
Number of markers		6		
Marker functions		Normal, frequency counter, noise marker, band power and AM/FM demod (tune and listen)		
Marker level readout resolution	Log scale	0.01 dB		
	Linear scale	≤ 1% of signal level		Nominal
Detectors		Normal, positive peak, sample, negative peak, average (video, RMS, voltage)		
Number of traces		4		
Trace functions		Clear/write, maximum hold, minimum hold, average		

1. RMS detector, trace averaging > 40, 0 dB input attenuation, input terminated 50 Ω, 1 kHz resolution bandwidth, 20 to 30 °C.

Specifications (continued)

Amplitude specifications (continued)				Supplemental information
Level display range (continued)				
Level measurement error	1 MHz to 7 GHz	Excluding input VSWR mismatch ± 1.3 dB		• 20 to 30 °C, 30 to 70% RH, peak detector, preamp off, input signal –50 to 0 dBm, 95% percentile • Swp Time Rule is set to Accuracy • Adds ± 0.3 dB when Swp Time Rule is set to Speed • Adds ±0.3 dB with 5-minute warm-up
	7 to 18 GHz	± 1.6 dB		
	18 to 20 GHz	± 1.8 dB		
Reference level [2]				
Setting range		–100 to +30 dBm		Steps of 1 dB
Setting resolution	Log scale	0.01 dB		
	Linear scale	Same as log (2.236 µV to 7.07 V)		
Accuracy		0		
RF input VSWR (at tuned frequency)				
1 MHz to 7 GHz		< 1.5:1		Nominal, ≥ 10 dB attenuation
7 to 18 GHz		< 2:1		
18 to 20 GHz		< 2.5:1		
Spurious response				
Second harmonic distortion		< –65 dBc, typical < –70 dBc, 50 MHz to 7 GHz		Mixer signal level at –30 dBm, input attenuation 0 dB, preamp off, 20 to 30 °C
		< –80 dBc, typical < –90 dBc, 7 to 20 GHz		
Third order intermodulation distortion (third order intercept)		5-min warm-up	30-min warm-up	Two –20 dBm tones at input mixer, spaced by 100 kHz, input attenuation 0 dB, preamp off, reference level ≥ –30 dBm, 20 to 30 °C
	50 to 300 MHz	+6.5 dBm, typical +7.5 dBm	+8 dBm, typical +9 dBm	
	300 MHz to 8 GHz	+7.5 dBm, typical +9.5 dBm	+9 dBm, typical +11 dBm	
	8 to 13 GHz	+8.5 dBm, typical +10.5 dBm	+10 dBm, typical +12 dBm	
	13 to 20 GHz	+11.5 dBm, typical +13.5 dBm	+13 dBm, typical +15 dBm	
Input related spurious		< –59 dBc, typical < –69 dBc	< –60 dBc, typical < –70 dBc	• –30 dBm signal at input mixer, span < 2.9 GHz • Exception: –55 dBc (2 × F1 = center frequency –5,890 MHz, 7 GHz < center frequency < 10 GHz, with F1 input frequency)
Inherent residual response	1 MHz to 7 GHz	< –93.5 dBm, typical –108.5 dBm	< –95 dBm, typical –110 dBm	Input terminated and 0 dB RF attenuation, preamplifier off
	7 GHz to 20 GHz	< –83.5 dBm, typical –91.5 dBm	< –85 dBm, typical –93 dBm	

2. Reference level only affects the display not the measurement, so trace data markers do not cause additional errors in measurement results.

Specifications (continued)

Sweep specifications		Supplemental information
Sweep time		
Range	2 ms to 1000 s	Span ≥ 100 Hz
	600 ns to 200 s	Span = 0 Hz (zero span)
Sweep mode	Continuous, single	
Sweep time rule	Accuracy, speed	
Trigger source	Free run, video, external, RF burst	
Trigger slope	Selectable positive or negative edge	
Trigger delay	± 12 ms to ± 12 s	Nominal, span = 0 Hz (zero span)
Front panel input/output		**Supplemental information**
RF input		
Connector and impedance	Type-N female, 50 Ω	Nominal
10 MHz reference/external trigger input		
Reference input frequency	10 MHz	
Reference input amplitude	0 to +10 dBm	
Trigger voltage	5 V TTL level	Nominal
Connector	BNC female, 50 Ω	Nominal
Probe power		
Voltage/current		+15 Vdc, ± 7% at 0 to 150 mA (nominal)
		–12.6 Vdc, ± 10% at 0 to 150 mA (nominal)
		GND
Connectivity		
USB host	USB Type-A female, compatible with USB 2.0 full speed	
USB device	USB Type-mini AB female, compatible with USB 2.0 full speed	
LAN	RJ-45, 10 Base-T	
General specifications		**Supplemental information**
Display		
Resolution	640 pixels x 480 pixels	
Size and type	170 mm (6.5 in) TFT color display	
Internal memory		
System memory	64 MB	For system use. Not user accessible
User memory	64 MB	User accessible. Able to store about 14,000 traces
Languages		
On-screen GUI	English, Simplified Chinese, Traditional Chinese, French, German, Italian, Japanese, Korean, Russian, Spanish, Portuguese	

Specifications (continued)

General specifications (continued)		Supplemental information
Power requirements and calibration		
Adaptor voltage	100 to 240 V AC, 50 to 60 Hz	Auto-ranging
	15 V DC, 5.3 A, 80 W max	
Power consumption	16 W	Typical
Battery operating time (fully charged battery)	3.5 hours	Tracking generator off, preamplifier on
	3 hours	Tracking generator on, preamplifier on
Charging time	3 hours	
Life time	300 to 500 charge cycles	
Warm-up time	5 minutes	
Calibration cycle	One year	
Environmental and size		
Temperature range	–10 to +50 °C	Operating (battery: 0 to 50 °C)
	–40 to +70 °C	Storage (battery: –20 to 50 °C)
Altitude	9,144 meters (30,000 feet)	Operating with battery
	3,000 meters (9,840 feet)	Operating with AC to DC adapter
	15,240 meters (50,000 feet)	Non-operating
Relative humidity	< 95%	
Weight	3.2 kg (7 lbs)	Net (shipping) approximately, 3.6 kg (7.9 lbs) with battery
Dimensions	318 mm × 207 mm × 69 mm (12.5 in × 8.15 in × 2.7 in)	Approximately (W × H × D)

Option specifications		Supplemental information
Channel scanner (Option SCN)		
Scan modes	Top N, bottom N, and list	
Channels displayed	1 to 20	
Display orientation	Vertical	Number of channels ≤ 5
	Horizontal	Number of channels > 5
Chart	Bar chart, and time chart	
Log file	.CSV and .KML	
Radio standards	Pre-defined and user-defined. Pre-defined standards include the major wireless communication standards such as GSM, CDMA, W-CDMA, LTE, WiMAX, etc.	
Spectrum monitor (Option SIM)		
Display modes	Spectrogram	
	Spectrum trace	
	Combination of spectrogram and spectrum trace in one screen	
RF preamplifier (Option P20)		
Frequency range	1 MHz to 20 GHz	
Gain	15 dB	Nominal
Tracking generator (Option TG7)		
Frequency range	5 MHz to 7 GHz	
Output level	0 to –20 dBm	1 dB steps
VSWR	< 2.0:1	Nominal
Connector and impedance	Type-N female, 50 Ω	

Specifications (continued)

Option specifications (continued)		Supplemental information
AM/FM modulation analysis (Option AMA)		
Frequency range	10 MHz to 20 GHz	
Carrier power accuracy	< 7 GHz, ± 1.5 dB	Nominal
	7 to 18 GHz, ± 1.8 dB	Nominal
	18 to 20 GHz, ± 2.0 dB	Nominal
Carrier power range	–30 to +10 dBm	1 to 500 MHz
	–30 to +20 dBm	500 MHz to 20 GHz
Carrier power displayed resolution	0.01 dBm	
AM measurement		
Modulation rate	20 Hz to 100 kHz	
Accuracy	1 Hz	Nominal (modulation rate < 1 kHz)
	< 0.1% modulation rate	Nominal (modulation rate > 1 kHz)
Depth	5 to 95%	
Accuracy	± 4%	Nominal
FM measurement		
Modulation rate	20 Hz to 200 kHz	
Accuracy	1 Hz	Nominal (modulation rate < 1 kHz)
	< 0.1% modulation rate	Nominal (modulation rate > 1 kHz)
Depth	20 Hz to 400 kHz	
Accuracy	± 4%	Nominal
ASK/FSK modulation analysis (Option DMA)		
Frequency range	2.5 MHz to 6 GHz	
Carrier power accuracy	± 2 dB	Nominal
Carrier power range	–30 to +20 dBm	Nominal
Carrier power displayed resolution	0.01 dBm	
ASK measurement		
Symbol rate range	100 Hz to 100 kHz	
Modulation depth/index	5 to 95%	
Accuracy	± 4%	Nominal
Displayed resolution	0.1%	
FSK measurement		
FSK deviation	100 Hz to 400 kHz	
Symbol rate range	100 Hz to 20 kHz	1 ≤ ß* ≤ 20
	20 to 50 kHz	1 ≤ ß ≤ 8
	50 to 100 kHz	1 ≤ ß ≤ 4
Accuracy	± 4%	Nominal
Displayed resolution	0.01 Hz	
Time-gated spectrum analysis (Option TMG)		
Gated sweep		
Span range	Any span	
RBW range	> = 1 kHz	VBW is fixed and equal to RBW [3]
Gate delay range	12 µs to 10 s	200 ns resolution
Gate length range	84 µs to 10 s	200 ns resolution

** ß is the ratio of frequency deviation to symbol rate (deviation/rate).*

Specifications (continued)

Option specifications (continued)		Supplemental information
Time-gated spectrum analysis (Option TMG)		
Gated sweep (continued)		
Gate sources	External	
	RF burst	
	Periodic timer	• Sync sources include free, external, and RF burst • Period: 0 to 20.0 s (*It should be greater than gate delay plus gate length)* • Offset: –5 to +5 s
RF burst		
Level range		–60 to –20 dBm plus attenuation (nominal)
Bandwidth (–10 dB)		8 MHz (nominal)
Frequency limitations		If the start or center frequency is too close to zero, LO feedthrough can degrade or prevent triggering. How close is too close depends on the bandwidth.
Built-in GPS receiver and GPS antenna (Option GPS)		
GPS information tagging	Longitude, latitude, and altitude	
GPS antenna	Built-in	
Frequency accuracy with GPS on	± 50 ppb	
External GPS antenna connector	SMA-F	External GPS antenna, N934xC-GPA, is offered as an optional accessory
USB peak and average power sensor support (Option PWP)		
Power sensor supported	Agilent U2020 X-series USB peak and average power sensor	
Frequency range	50 MHz to 40 GHz	Sensor dependent
Peak power dynamic range	–30 to +20 dBm	
USB average power sensor support (Option PWM)		
Power sensor supported	Agilent U2000 Series USB power sensor	
Frequency range	9 kHz to 24 GHz	Sensor dependent
Dynamic range	–60 to +44 dBm	Sensor dependent
Security features (Option SEC)		
Security erase	Erase the entire user flash memory by writing single character "1" over all memory locations	Non-recoverable
Port control	Disable/enable LAN port or USB port	
Task planner for test automation (Option TPN)		
Task plan execution mode	Auto, manual, and manual if fail	
Task plan file	.TPN	Complementary task plan editor is available with HSA PC software
Number of tasks	Maximum 20 in a single .TPN file	
Measurements supported	Regular spectrum analysis and power suite (channel power, ACPR, and OBW)	

Visit **www.agilent.com/find/taskplanner** for more information.

3. For efficiency and convenience, RBW is restricted to be equal to or greater than 1 kHz and VBW is restricted to be equal to RBW.

myAgilent

www.agilent.com/find/myagilent
A personalized view into the information most relevant to you.

Three-Year Warranty

www.agilent.com/find/ThreeYearWarranty
Beyond product specification, changing the ownership experience. Agilent is the only test and measurement company that offers three-year warranty on all instruments, worldwide.

Agilent Assurance Plans

www.agilent.com/find/AssurancePlans
Five years of protection and no budgetary surprises to ensure your instruments are operating to specifications and you can continually rely on accurate measurements.

www.agilent.com/quality

Agilent Electronic Measurement Group
DEKRA Certified ISO 9001:2008
Quality Management System

Agilent Channel Partners

www.agilent.com/find/channelpartners
Get the best of both worlds: Agilent's measurement expertise and product breadth, combined with channel partner convenience.

www.agilent.com
www.agilent.com/find/N9344C
www.agilent.com/find/hsa-videos

For more information on Agilent Technologies' products, applications or services, please contact your local Agilent office. The complete list is available at:
www.agilent.com/find/contactus

Americas

Canada	(877) 894 4414
Brazil	(11) 4197 3600
Mexico	01800 5064 800
United States	(800) 829 4444

Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 112 929
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 375 8100

Europe & Middle East

Belgium	32 (0) 2 404 93 40
Denmark	45 45 80 12 15
Finland	358 (0) 10 855 2100
France	0825 010 700* *0.125 €/minute
Germany	49 (0) 7031 464 6333
Ireland	1890 924 204
Israel	972-3-9288-504/544
Italy	39 02 92 60 8484
Netherlands	31 (0) 20 547 2111
Spain	34 (91) 631 3300
Sweden	0200-88 22 55
United Kingdom	44 (0) 118 927 6201

For other unlisted countries:
www.agilent.com/find/contactus
(BP-09-27-13)

Product specifications and descriptions in this document subject to change without notice.

© Agilent Technologies, Inc. 2014
Published in USA, February 11, 2014
5990-7193EN

Agilent Technologies